

Inventor: Sally Mackenzie  
Title: Implementation of a Mitochondrial Mutator  
Docket No.: 1231-218

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	1	50
Arabidopsis	(1) --MHWIATRNAVVSFPKWR---FFFRSSYRTYSSLKPSSPILLNRRYSEG	
Common Bean	(1) --MYRAVTRNAVFLPRCRSLSHFSLSLFPFFISSLPSRFLRINGRVKNV	
Soybean	(1) --MYRVATRNAVAVFFPRCCSFAHYTPSLFPIFTSFAPSRFLRINGCVKNV	
Rice	(1) MAIQRL LASSLVAATPRWLP-----VAADSFLRRRHRPRCSPLPALLFNR	
Tomato	(1) --MYWVTAKNVVSVPRWR-----SLSLFLRPPLRRRFLSFSPTLC	
Consensus	(1) MYRV TRNVVS PRWR F SSF F S PSR L ING V N	
	51	100
Arabidopsis	(46) ISCLR DGSKLKRITTASKKVKTSSDVLTDKDLSHLVWVKERLQTCKKPST	
Common Bean	(49) STYMDNNRVSRGSSRTTKPKVPNNVLDDKDLPHISWWKERLQMCKKFST	
Soybean	(49) PSYTDKKVS-RGSSRATKKPKIPNNVLDDKDLPHILWWKERLQMCRKFST	
Rice	(46) RWSKPRKVSRSISIVSRKMKNQGDLCNEGMLPHILWWKEKMERCRKPSS	
Tomato	(41) REQIRCVKERKFFATTAKKLKQPKSIPEEKDYVNIMWWKERMEFLRKPSS	
Consensus	(51) SYIR K R S SKKLK P VLDDKDLPHILWWKERLQ CRKPST	
	101	150
Arabidopsis	(96) LQLIERLMTNLLGLDPSLRNGSLKDGNLNWEMLQFKSRFPREVLLCRVG	
Common Bean	(99) VQLIQRLEFSNLLGLDSKLKNGSVKEGTLNWEMLQFKSKFPQVLLCRVG	
Soybean	(98) VQLIERLEFSNLLGLNSNLKNGSLKEGTLNWEMLQFKSKFPQVLLCRVG	
Rice	(96) MQLTQRLVYSNILLGLDPTLRNGSLKDGSLNTEMLQFKSKFPREVLLCRVG	
Tomato	(91) ALLAKRLTYCNLLGVDPSLRNGSLKEGTLNSEMLQFKSKFPREVLLCRVG	
Consensus	(101) VQLI RL YSNLLGLDPSLRNGSLKEGTLNWEMLQFKSKFPREVLLCRVG	
	151	200
Arabidopsis	(146) EFYEAIGIDACILVEYAGLNPFGLRSDSIPKAGCPIMNLRQTLDLDRN	
Common Bean	(149) EFYEAWGIDACVLVEYAGLNPCGGLQSDSVPRAGCPVVNLRQTLDLDTQN	
Soybean	(148) EFYEAWGIDACILVEYVGLNPIGGLRSDSIPRASCPPVNLRQTLDLDTTN	
Rice	(146) DFYEAVGFDACILVEHAGLNPFGLRSDSIPKAGCPVMNLRQTLDLDRN	
Tomato	(141) DFYEAIGFDACILVEYAGLNPFGLHSDSIPKAGCPVVNLRQTLDLDRN	
Consensus	(151) EFYEAIGIDACILVEYAGLNPFGLRSDSIPKAGCPVVNLRQTLDLDRN	
	201	250
Arabidopsis	(196) GYSVCIVEEVQGPTPARSRKGRFISGHAHPGSPYVYGLVGDHDLDFPDP	
Common Bean	(199) GYSVCIIIEVQGPTQARSRKRRFISGHAHPGNPYVYGLAAVDHDLNFPEP	
Soybean	(198) GYSVCIVEEAQGPSQARSRKRRFISGHAHPGNPYVYGLATVDHDLNFPEP	
Rice	(196) GYSVCIVEEIQGPTQARARKGRFISGHAHPGSPYVYGLAEVDHDFPDP	
Tomato	(191) GFSVCVVEEVQGPTQARARKSRFISGHAHPGSPYVYGLVXDDQDLDFPEP	
Consensus	(201) GYSVCIVEEVQGPTQARSRK RFISGHAHPGSPYVYGLA VDHDLDFPEP	
	251	300
Arabidopsis	(246) MPVVGISRSARGYCMISIFETMKAYSLDDGLTEEALVTKLRTRRCHHLFL	
Common Bean	(249) MPVIGISHSARGYCINMVLETMKTYSYEDCLTEEAIVTKLRTCQYHHLFL	
Soybean	(248) MPVVGISHSARGYCINMVLETMKTYSSEDCLTEEAVVTKLRTCQYHYHLFL	
Rice	(246) MPVVGISRSARGYCLISVLETMKTYSAEGLTEEAVVTKLRICRYHHLFL	
Tomato	(241) MPVVGISRSARGYCIISVYETMKTYSVEDGLTEEAVVTKLRTRCHHFFL	
Consensus	(251) MPVVGISRSARGYCIISVLETMKTYS EDGLTEEAVVTKLRTRYHHLFL	
	301	350
Arabidopsis	(296) HASLRHNASGTCRWGEFGEGLLWGECSRRNFEWFEGDTLSELLSRVKDV	
Common Bean	(299) HTSLTQDSCGTSKWGEFGEGLLWGECSRRHFEWFDGSPSLDLVKVEL	
Soybean	(298) HTSLRRNSCGTCNWGEFGEGLLWGECSRRHFDWFDGNPVSDDLAKVKEL	
Rice	(296) HSSLRNNSSGTSRWGEFGEGLLWGECSGKSEWFDGNPIEELLCKVREI	
Tomato	(291) HNSLKNSSGTSRWGEFGEGLLWGECSNARQEWLDGNPIDELLFKVKEL	
Consensus	(301) HTSLRNNSSGTSRWGEFGEGLLWGECSR FEWFDGNPISELL VKVEL	
	351	400

Figure 3

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Arabidopsis	(346)	YGLDDEVSFERNVNPVSKNRPRPLHLGTATQIGALPTEGIPCLLKVLLPST	
Common Bean	(349)	YGLDDEVTFRNNTTVSSRHRARPLTLGTSTQIGAIHTEGIPSLLKVLLSPS	
Soybean	(348)	YSIDDEVTFRNNTTVSSGHRARPLTLGTSTQIGAIPTGEGIPSLLKVLLPSN	
Rice	(346)	YGLEEKTVFRNVSVSLEGRPQPLYLGTATQIGVIPTEGIPSLLKIVLPPN	
Tomato	(341)	YGLNDDIPFRNVTVSENRRPRPLHLGTATQIGAIPTGEGIPCLLKVLLPPH	
Consensus	(351)	YGLDDEVTFRNVTVSS RPRPLHLGTATQIGAIPTGEGIPSLLKVLLPP	450
		401	
Arabidopsis	(396)	CSGLPSLYVRDLLLLNPPAYDIALKIQETCKLMSTVTCSEIPEFTCVSSAKL	
Common Bean	(399)	CNGLPVLYIRNLLLNPSSYEIASKIQETCKLMSSLTCSIPEFTCVSSAKL	
Soybean	(398)	CNGLPVLYIRELLLNPSSYEIASKIQATCKLMSSVTCSIPEFTCVSSAKL	
Rice	(396)	FGGLPSLYIRDLLLLNPSSFVASSVQACRLMGSITCSIPEFTCIPAAKL	
Tomato	(391)	CSGLPVLYIRDLLLLNPPAYEISSDIQACRLMMSVTCSIPDFTCISSAKL	
Consensus	(401)	C GLPVLYIRDLLLLNPSSYEIASKIQETCKLMSSVTCSIPEFTCVSSAKL	500
		451	
Arabidopsis	(446)	VKLEQREANYIEFCRIKNVLDDVLHMRHAELVEILKLLMDPTWVATGL	
Common Bean	(449)	VKLEWREVNHEFCRIKNVLDEILHMYKTSELNEILKNLIDPTWATTGL	
Soybean	(448)	VKLEWREVNHEFCRIKNVLDEILQMYSTSELNEILKHLIEPTWVATGL	
Rice	(446)	VKLESKEVNHIEFCRIKNVLDEVLFMGSAELSAELNKLDPAAIVTGF	
Tomato	(441)	VKLELREANHVEFCRIKSMVEEILQLYRNSELRAIVELMDPTWVATGL	
Consensus	(451)	VKLE REVNHEFCRIKNVLDEIL MYR SEL EILK LIDPTWVATGL	550
		501	
Arabidopsis	(496)	KIDFDTFVNECHWASDTIGEMISLDENESHQNVSKCDNVPNEFFYDMESS	
Common Bean	(499)	DIDFETLVSGCEVASSKISEIISLDGGN-DQKINSLSIIPYEFFEDTESK	
Soybean	(498)	EIDFETLVAGCEIASSKIGEIVSLDDEN-DQKINSFSFIPHEFFEDMESK	
Rice	(496)	KVEADILVNECSFISQRIAEVISLGGES-DQAITSEYIPKEFFNGMESS	
Tomato	(491)	KVDFDTLVNECGKISCRISEIISVHGEN-DQKISSYPIIPNDFEFDEMELL	
Consensus	(501)	KIDFDTLVNEC AS KISEIISLDGEN DQKISS IP EFFEDMES	600
		551	
Arabidopsis	(546)	WRGRVKGIHIEEITQVEKSAEALSLAVAEDFHPIISRIKATTASLGGP	
Common Bean	(548)	WKGRIKRVHIDEVFTAVQKAAEVLHIAVTEDFVPVVSRIKATAPLGGP	
Soybean	(547)	WKGRIKRIHIDDVFTAVEKAAEALHIAVTEDFVPVVSRIKATAPLGGP	
Rice	(545)	WKGVRKRVHAEFEFSNVDAEALSTAVIEDFLPIISRVKSVMSNGSSK	
Tomato	(540)	WKGVRKRIHLEEAYAEVEKAADALSLAITEFLPIISRIKATMAPLGGTK	
Consensus	(551)	WKGVRKRIHIEE FT VEKAAEALSIAVTEFLPIISRIKATMAPLGGP	650
		601	
Arabidopsis	(596)	GEIAYAREHESVWFKGKRFTPSIWAGTAGEDQIKQLKPAIDSKGKKVGEE	
Common Bean	(598)	GEISYAREHEAVWFRGKRFTPSLWSGSPGEEQIKQLRHALDSKGKRVGEE	
Soybean	(597)	GEISYAREQEAVWFKGKRFTPNLWAGSPGEEQIKQLRHALDSKGKRVGEE	
Rice	(595)	GEISYAKEHESVWFKGRRFTPNVWANTPGELQIKQLKPAIDSKGKRVGEE	
Tomato	(590)	GEILYAREHGAVWFKGKRFPVTVWAGTAGEEQIKQLRPAIDSKGKKVGEE	
Consensus	(601)	GEISYAREHEAVWFKGKRFTPSLWAGTPGEEQIKQLRPAIDSKGKKVGEE	700
		651	
Arabidopsis	(646)	WFTTPKVEIALVRYHEASENAKARVLELLRELSVKLQTKINLVFASMLL	
Common Bean	(648)	WFTTPKVEAALTRYHEANAKATERVLEILRELATELHYSINILVFSSTLL	
Soybean	(647)	WFTTPKVEAALTRYHEANAKAKERVLEILRGLAAELQYSINILVFSSTLL	
Rice	(645)	WFTTIKVENALTRYHEACDNAKRKVLLELLRGLSSELQDKINLVFCSTML	
Tomato	(640)	WFTTMRVEDAIARYHEASARAKSRVLELLRGLSSELLSKINILIFASVLN	
Consensus	(651)	WFTTPKVE ALTRYHEA AKAK RVLELLRGLSSELQ KINILVFASMLL	

Figure 3 (cont'd)

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		701	750
Arabidopsis	(696)	VISKALFSHACEGRRRKWVFPTLVGFSLDEGAKPLDGASRMKLTGLSPYW	
Common Bean	(698)	VITKALFAHASEGRRRRWVFPTLAESNGFEDVKSSDKIHGMKIVGLAPYW	
Soybean	(697)	VIAKALFAHASEGRRRRWVFPTLVESHGFEDVKSLDKTHGMKISGLLPYW	
Rice	(695)	IITKALFGHVSEGRRRGWVLPITSP--LCKDNVTEEISSEMELSGTFPYW	
Tomato	(690)	VIAKSLFSHVSEGRRRNWIFPTITQFNKCQDTEALNGTDGMKIIGLSPYW	
Consensus	(701)	VITKALFAHASEGRRRRWVFPTL ED KSLD T GMKISGLSPYW	
		751	800
Arabidopsis	(746)	FDVSSGTAVHNTVDMQSLFLLTGPNNGGKSSLLRSICAAALLGISGLMVP	
Common Bean	(748)	FHIAEG-IVRNDVDMQSLFLLTGPNNGGKSSLLRSICAAALLGICGLMVP	
Soybean	(747)	FHIAEG-VVRNDVDMQSLFLLTGPNNGGKSSFLRSICAAALLGICGLMVP	
Rice	(743)	LDTNQGNAILNDVHMHSFLILTGPNGGGKSSMLRSVCAAALLGICGLMVP	
Tomato	(740)	FDAARGTGVQDVTVDQMFMFLLTGPNGGGKSSLLRSICAAALLGMCGFMVP	
Consensus	(751)	FDIA G AV NDVDMQSLFLLTGPNNGGKSSLLRSICAAALLGICGLMVP	
		801	850
Arabidopsis	(796)	AESACIPHFDSIMLHMKSYSYDSPVDGKSSSQVEMSEIRSIVSQATSRSVLV	
Common Bean	(797)	AESAVIPYFDSITLHMKSYSYDSPADKKSSSQVEMSELRSIIGGTTKRSLVL	
Soybean	(796)	AESALIPYFDSITLHMKSYSYDSPADKKSSSQVEMSELRSIIGGTTNRSLVL	
Rice	(793)	AASAVIPHFDSIMLHMKAIDSPADGKSSSQIEMSEIRSLVCRATARSVLV	
Tomato	(790)	AESAVIPHFDSIMLHMKSYSYDSPVDGKSSSQIEMSEIRSLITGATSRSVLV	
Consensus	(801)	AESAVIPHFDSIMLHMKSYSYDSPADGKSSSQVEMSEIRSII GATSRSVLV	
		851	900
Arabidopsis	(846)	IDEICRGTTETAKGTCTIAGSVVESLDTSGCLGIVSTHLHGIFSLPLTAKNI	
Common Bean	(847)	VDEICRGTTETAKGTCTIAGSIIETLERIGCLGVVSTHLHGIFTPLPLNIKST	
Soybean	(846)	VDEICRGTTETAKGTCTIAGSIIETLDGIGCLGIVSTHLHGIFTPLPLNKKNT	
Rice	(843)	IDEICRGTTETAKGTCTIAGSIIERLDNVGCIGIISTHLHGIFDLPLSLHNT	
Tomato	(840)	IDEICRGTTETAKGTCTIAGSVIETLDEIGCLGIVSTHLHGIFDLPLKIKKT	
Consensus	(851)	IDEICRGTTETAKGTCTIAGSIIETLD IGCLGIVSTHLHGIFTPL IKNT	
		901	950
Arabidopsis	(896)	TYKAMGAENVEGQTKPTWKLTGVCRESLAFETAKREGVPESVIQRAEAL	
Common Bean	(897)	VHKAMGTTCIDGQILPTWKLTGVCRESLAFETAIREGIPEPIIRRAECL	
Soybean	(896)	VHKAMGTTSIDGQIMPTWKLTGVCRESLAFETAKREGIPEHIVRRAEYL	
Rice	(893)	DFKAMGTEIIDRCIQPTWKLMGICRESLAFQTARKEGMPDLIIRRAEEL	
Tomato	(890)	VYKAMGAEYVDGQPIPTWKLIDGICKESLAFETAQREGIPEILIQRAEEL	
Consensus	(901)	VHKAMGTE IDGQIIPPTWKLTGVCRESLAFETAKREGIPE IIRRAE L	
		951	1000
Arabidopsis	(946)	YLSVYAK-----DASAEVVKPDQIITSSNN-----DQQIQKPV	
Common Bean	(947)	YKSVYA-----EENFPNEEKFSTCINNLLNLTTSLY-----SKGFLSGA	
Soybean	(946)	YQLVYAKEMLFENFPNEEKFSTCINVNNLNGTHLH-----SKRFLSGA	
Rice	(943)	YLAMSTN-----SKHTSSAVHHEISIANSTVNSLVEKPNYLRNGLELQS	
Tomato	(940)	YNSAYGNQIPRKIDQIRPLRSDIDLNSTDNSSDQLNGTRQIALDSSTKLM	
Consensus	(951)	Y SVYA EK S INI NL TTSL A	
		1001	1050
Arabidopsis	(979)	SSERSLEKDLAKAIVKICGKKMIEP-----EAIECLSIGARELPPP	
Common Bean	(986)	NQMEGFRQEVERAITVICQDYIMERKNKKIALELPEIKCLLIGKREQPPP	
Soybean	(990)	NQMEVLRREEVERAVTVICQDHIKDLKCKKIALELTEIKCLIIGTRELPPP	
Rice	(987)	GSFGLLRKEIESVVTICKKKLLDLYNKRSISELIEVVVCVAVGAREQPPP	
Tomato	(990)	HRMGISSKKLEDAICLICEKKLIELYKMKNPSEMPMVNVCVIAAREQPAP	
Consensus	(1001)	M ILRKELERAITVIC KKIIE L KK EL EI CLLIGAREQPPP	
		1051	1100

Figure 3 (cont'd)

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Arabidopsis	(1020)	STVGSSCVYVMRRPDKRLYIGQTDDELEGRIRAHRAKEGLQGSSFLYLMVQ
Common Bean	(1036)	SVVGSSSVYVIFTDPKKLYVGETDDLEGRVRRHRLKEGMDEASFLYFLVP
Soybean	(1040)	SVVGSSSVYVMFRPDKKLYVGETDDLEGRVRRHRLKEGMHDASFLYFLVP
Rice	(1037)	STVGRSSIYVIIIRDSKLYIGQTDLDVGRLSAHRKEGMQDATILYILVP
Tomato	(1040)	STIGASSVYIMLRPDKKLYVGQTDDELEGRVRAHRLKEGMENASFLYFLVS
Consensus	(1051)	STVGSSSVYVM RPDKKLYVGQTDDELEGRVRAHRLKEGM DASFLYFLVP
		1101 1150
Arabidopsis	(1070)	GKSMACQLETLLINQLHEQGYSLANLADGKHRNFGTSSSLSTSDVVSIL-
Common Bean	(1086)	GKSLACQFESLLINQLSSQGFQLSNMADGKHRNFGTSNLYA-----
Soybean	(1090)	GKSLACQFESLLINQLSGQGFQLSNIADGKHRNFGTSNLYT-----
Rice	(1087)	GKSIACQLETLLINQLPLKGFKLINKADGKHRNFGISLVPGEAIAA----
Tomato	(1090)	GKSIACQLETLLINQLPNHGFQLTNVADGKHRNFG-----
Consensus	(1101)	GKSIACQLETLLINQL QGFQLSNIADGKHRNFGTS L

Arabidopsis	SEQ ID NO: 3
Common Bean	SEQ ID NO: 47
Soybean	SEQ ID NO: 31
Rice	SEQ ID NO: 22
Tomato	SEQ ID NO: 40
Consensus	SEQ ID NO: 65

Figure 3 (cont'd)